# Project 3
# Operation Analytics and Investigating Metric Spike

**Project Description:** This project aims to improve the company's operations and understand and explain sudden changes in key metrics by investigating the metric spikes from the data that is collected. This analysis helps to identify areas for improvement within the company by deriving valuable insights.

**Approach:** This project is executed using using SQL. It involves creation of database from the raw data, then extracting the data based on the relation between different tables and columns to obtain the required data, to analyze the insights from that data.

**Tech-Stack Used:** The tech-stack used for this project is MySQL Ver 8.0.37.

## Insights:

## Case Study 1: Job Data Analysis

Creating the database for Case Study 1

**Code:**

```
create database p3;
show databases;
use p3;

#Data imported to database p3 using ‘’ Table Data Import wizard “

# Changing STR type to DATETIME for ds column
ALTER TABLE job_data ADD COLUMN temp_ds DATE;
SET SQL_SAFE_UPDATES = 0;
UPDATE job_data SET temp_ds = STR_TO_DATE(ds, '%m/%d/%Y');
ALTER TABLE job_data DROP COLUMN ds;
ALTER TABLE job_data CHANGE COLUMN temp_ds ds DATE;
```

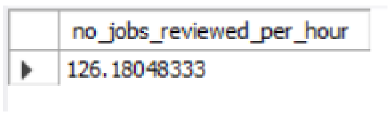
**1) Jobs Reviewed Over Time:**

**Objective:** Calculate the number of jobs reviewed per hour for each day in November 2020.

**Code:**

```
SELECT avg(jobs_per_day) AS no_jobs_reviewed_per_hour FROM (
SELECT ds,
count(job_id)/sum(time_spent)*60*60 AS jobs_per_day
FROM job_data
WHERE month(ds)=11 AND year(ds)=2020
GROUP BY ds) AS table1;
```

**Results:**



| no_jobs_reviewed_per_hour |
|---|
| 126.18048333 |

**Insights:**

It is found that 126 jobs are reviewed per hour for each day in November 2020.

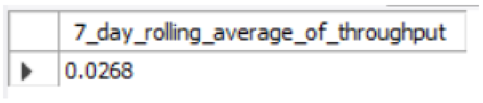
**2) Throughput Analysis:**

**Objective:** Calculate the 7-day rolling average of throughput (number of events per second).

**Code:**

```
SELECT count(event)/sum(time_spent) AS 7_day_rolling_average_of_throughput FROM
job_data;
```

**Results:**

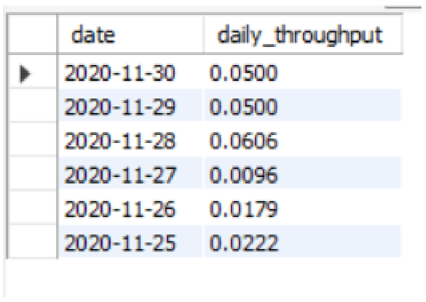


| 7_day_rolling_average_of_throughput |
|---|
| 0.0268 |

**Code:**

```
SELECT ds AS date, count(event)/sum(time_spent) AS daily_throughput FROM job_data
GROUP BY ds;
```

**Results:**



| date | daily_throughput |
|---|---|
| 2020-11-30 | 0.0500 |
| 2020-11-29 | 0.0500 |
| 2020-11-28 | 0.0606 |
| 2020-11-27 | 0.0096 |
| 2020-11-26 | 0.0179 |
| 2020-11-25 | 0.0222 |

**Insights:**

7-day rolling average of throughput is 0.0268.

Both 7-day rolling average and daily average are important to understand and improve the company's operations but 7-day rolling average can explain in a better way in which trend is the business is moving, so that changes can be made to improve the business in long term. Daily average reflects the sudden changes in the business which can help in short term to improve the business.

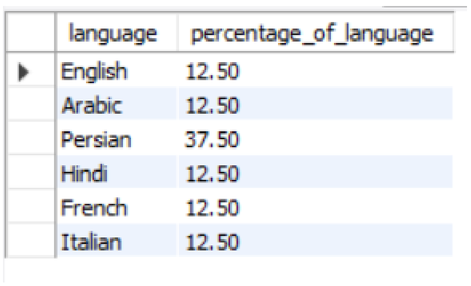
**3) Language Share Analysis:**

**Objective:** Calculate the percentage share of each language in the last 30 days.

**Code**:

```
SELECT language,
round((language_count/(SELECT count(*) FROM job_data))*100,2) AS percentage_of_language
FROM (
SELECT language, count(*) AS language_count FROM job_data
GROUP BY language) AS table1
GROUP BY language;
```

**Results:**



| language | percentage_of_language |
|---|---|
| English | 12.50 |
| Arabic | 12.50 |
| Persian | 37.50 |
| Hindi | 12.50 |
| French | 12.50 |
| Italian | 12.50 |

**Insights:**

In last 30 days, Persian language has the largest usage share of 37.50%. The remaining languages English, Arabic, Hindi, French and Italian have a share of 12.50% each.

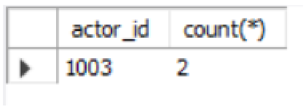
**4)** Duplicate Rows Detection:

**Objective:** Identify duplicate rows in the data.

**Code:**

```
SELECT actor_id, count(*) FROM job_data
GROUP BY actor_id
HAVING count(*)>1;
```

**Results:**



| actor_id | count(*) |
|---|---|
| 1003 | 2 |

**Insights:**

Actor_id 1003 has two job_id, therefore actor_id 1003 has a duplicate row.

## Case Study 2: Investigating Metric Spike

**Code:**

Creating the database for Case Study 2

```
CREATE DATABASE project3;
SHOW DATABASES;
USE project3;

#TABLE - 1 users

CREATE TABLE users(
user_id INT,
created_at VARCHAR(100),
company_id INT,
language VARCHAR(50),
activated_at VARCHAR(100),
state VARCHAR(50));

SHOW VARIABLES LIKE 'secure_file_priv';

LOAD DATA INFILE "C:/ProgramData/MySQL/MySQL Server 8.0/Uploads/users.csv"
INTO TABLE users
FIELDS TERMINATED BY ','
ENCLOSED BY '"'
LINES TERMINATED BY '\n'
IGNORE 1 ROWS;

# Changing STR type to DATETIME for created_at column
ALTER TABLE users ADD COLUMN temp_created_at DATETIME;
SET SQL_SAFE_UPDATES = 0;
UPDATE users SET temp_created_at = STR_TO_DATE(created_at, '%d-%m-%Y %H:%i');
ALTER TABLE users DROP COLUMN created_at;
ALTER TABLE users CHANGE COLUMN temp_created_at created_at DATETIME;

# Changing STR type to DATETIME for activated_at COLUMN
ALTER TABLE users ADD COLUMN temp_activated_at DATETIME;
UPDATE users SET temp_activated_at = STR_TO_DATE(activated_at, '%d-%m-%Y %H:%i');
ALTER TABLE users DROP COLUMN activated_at;
ALTER TABLE users CHANGE COLUMN temp_activated_at activated_at DATETIME;

#TABLE - 2 events
```

```
CREATE TABLE events(
user_id INT,
occurred_at VARCHAR(100),
event_type VARCHAR(100),
event_name VARCHAR(100),
location VARCHAR(100),
device VARCHAR(50),
user_type INT);

LOAD DATA INFILE "C:/ProgramData/MySQL/MySQL Server 8.0/Uploads/events.csv"
INTO TABLE events
FIELDS TERMINATED BY ','
ENCLOSED BY '"'
LINES TERMINATED BY '\n'
IGNORE 1 ROWS;

# Changing STR type to DATETIME for occurred_at column
ALTER TABLE events ADD COLUMN temp_occurred_at DATETIME;
UPDATE events SET temp_occurred_at = STR_TO_DATE(occurred_at, '%d-%m-%Y %H:%i');
ALTER TABLE events DROP COLUMN occurred_at;
ALTER TABLE events CHANGE COLUMN temp_occurred_at occurred_at DATETIME;

#TABLE - 3 email_events

CREATE TABLE email_events(
user_id INT,
occurred_at VARCHAR(100),
action VARCHAR(100),
user_type INT);
```

```
LOAD DATA INFILE "C:/ProgramData/MySQL/MySQL Server 8.0/Uploads/email_events.csv"
INTO TABLE email_events
FIELDS TERMINATED BY ','
ENCLOSED BY '"'
LINES TERMINATED BY '\n'
IGNORE 1 ROWS;

# Changing STR type to DATETIME for occurred_at column
ALTER TABLE email_events ADD COLUMN temp_occurred_at DATETIME;
UPDATE email_events SET temp_occurred_at = STR_TO_DATE(occurred_at, '%d-%m-%Y %H:%i');
ALTER TABLE email_events DROP COLUMN occurred_at;
ALTER TABLE email_events CHANGE COLUMN temp_occurred_at occurred_at DATETIME;
```

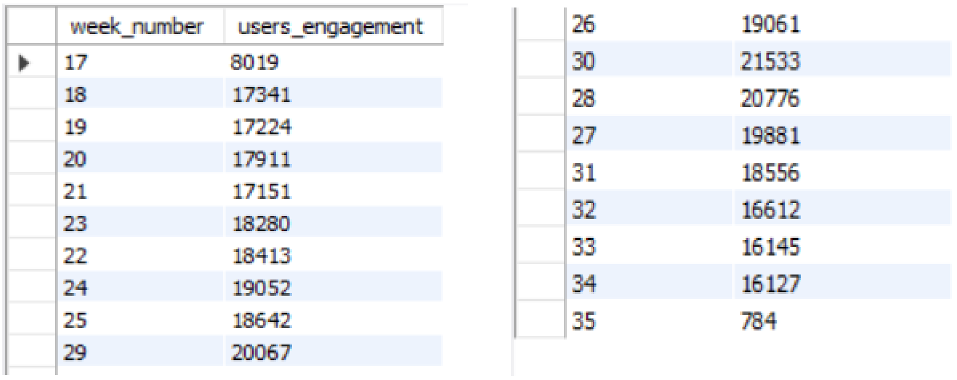
**1)** Weekly User Engagement:

**Objective:** Measure the activeness of users on a weekly basis.

**Code:**

```
SELECT week(occurred_at) AS week_number, count(event_type) AS users_engagement FROM events
WHERE event_type = 'engagement'
GROUP BY week_number;
```

Results:



| week_number | users_engagement |
|---|---|
| 17 | 8019 |
| 18 | 17341 |
| 19 | 17224 |
| 20 | 17911 |
| 21 | 17151 |
| 23 | 18280 |
| 22 | 18413 |
| 24 | 19052 |
| 25 | 18642 |
| 29 | 20067 |
| 26 | 19061 |
| 30 | 21533 |
| 28 | 20776 |
| 27 | 19881 |
| 31 | 18556 |
| 32 | 16612 |
| 33 | 16145 |
| 34 | 16127 |
| 35 | 784 |

**Insights:**

The above image shows the activeness of users on a weekly basis. Week number 30 has the most user engagement of 21533 users and week number 35 has the least engagement of 784 users.

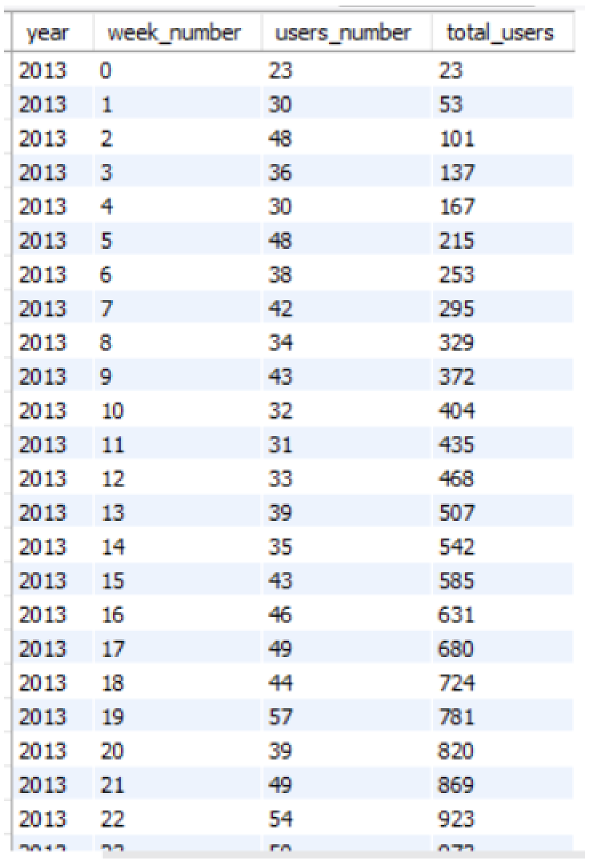
**2)** User Growth Analysis:

**Objective:** Analyze the growth of users over time for a product.

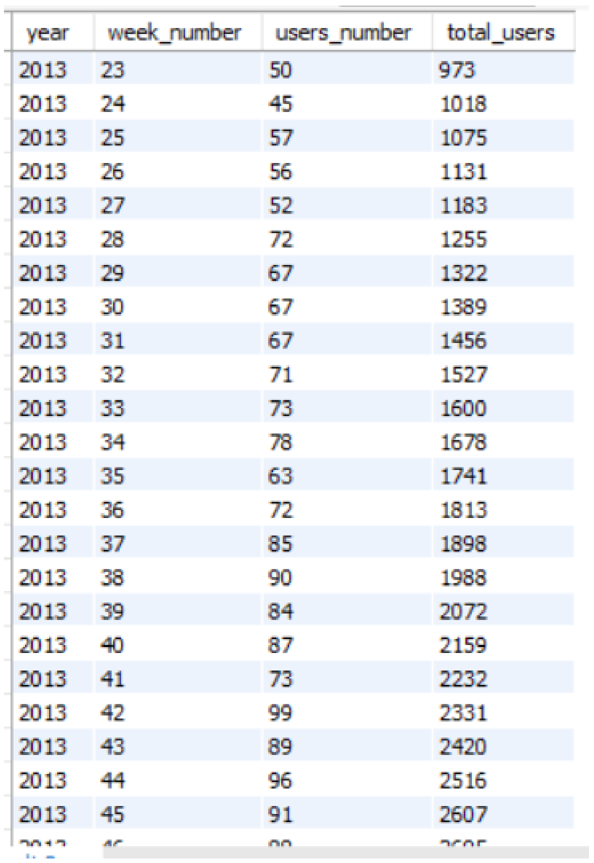
**Code:**

```
SELECT year, week_number, users_number,
sum(users_number) over(ORDER BY year, week_number) AS total_users FROM (
SELECT year(created_at) AS year, week(created_at) AS week_number, count(*) AS users_number
FROM users
GROUP BY year, week_number) AS table1
GROUP BY year, week_number;
```

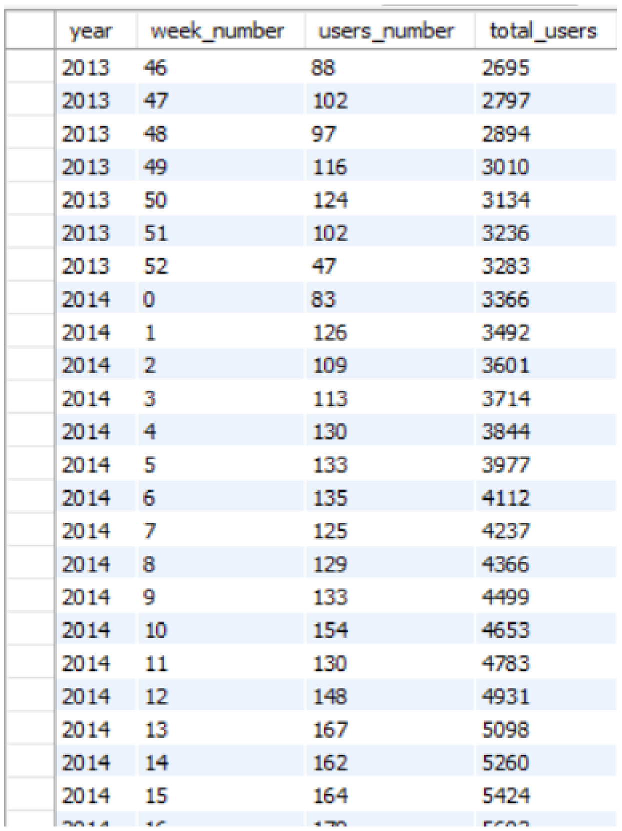
Results:



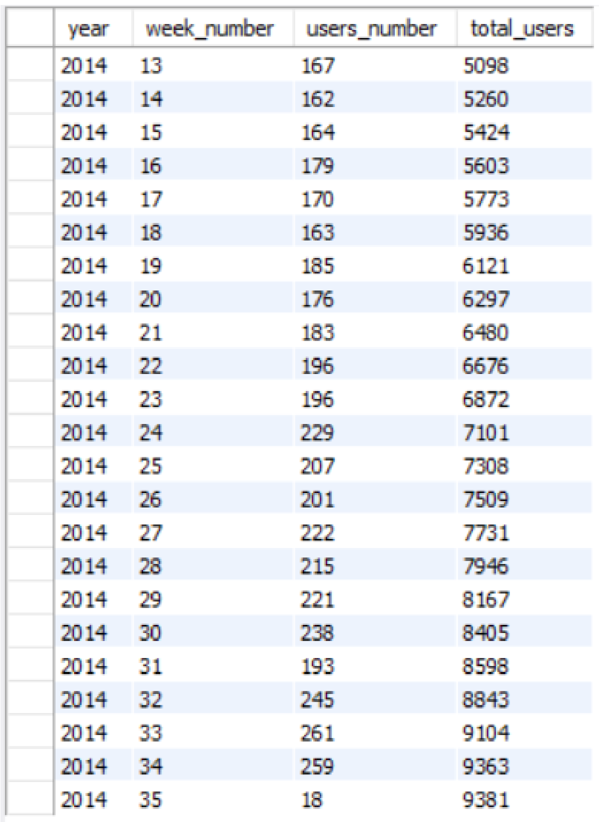
| year | week_number | users_number | total_users |
|---|---|---|---|
| 2013 | 0 | 23 | 23 |
| 2013 | 1 | 30 | 53 |
| 2013 | 2 | 48 | 101 |
| 2013 | 3 | 36 | 137 |
| 2013 | 4 | 30 | 167 |
| 2013 | 5 | 48 | 215 |
| 2013 | 6 | 38 | 253 |
| 2013 | 7 | 42 | 295 |
| 2013 | 8 | 34 | 329 |
| 2013 | 9 | 43 | 372 |
| 2013 | 10 | 32 | 404 |
| 2013 | 11 | 31 | 435 |
| 2013 | 12 | 33 | 468 |
| 2013 | 13 | 39 | 507 |
| 2013 | 14 | 35 | 542 |
| 2013 | 15 | 43 | 585 |
| 2013 | 16 | 46 | 631 |
| 2013 | 17 | 49 | 680 |
| 2013 | 18 | 44 | 724 |
| 2013 | 19 | 57 | 781 |
| 2013 | 20 | 39 | 820 |
| 2013 | 21 | 49 | 869 |
| 2013 | 22 | 54 | 923 |



| year | week_number | users_number | total_users |
|---|---|---|---|
| 2013 | 23 | 50 | 973 |
| 2013 | 24 | 45 | 1018 |
| 2013 | 25 | 57 | 1075 |
| 2013 | 26 | 56 | 1131 |
| 2013 | 27 | 52 | 1183 |
| 2013 | 28 | 72 | 1255 |
| 2013 | 29 | 67 | 1322 |
| 2013 | 30 | 67 | 1389 |
| 2013 | 31 | 67 | 1456 |
| 2013 | 32 | 71 | 1527 |
| 2013 | 33 | 73 | 1600 |
| 2013 | 34 | 78 | 1678 |
| 2013 | 35 | 63 | 1741 |
| 2013 | 36 | 72 | 1813 |
| 2013 | 37 | 85 | 1898 |
| 2013 | 38 | 90 | 1988 |
| 2013 | 39 | 84 | 2072 |
| 2013 | 40 | 87 | 2159 |
| 2013 | 41 | 73 | 2232 |
| 2013 | 42 | 99 | 2331 |
| 2013 | 43 | 89 | 2420 |
| 2013 | 44 | 96 | 2516 |
| 2013 | 45 | 91 | 2607 |



| year | week_number | users_number | total_users |
|---|---|---|---|
| 2013 | 46 | 88 | 2695 |
| 2013 | 47 | 102 | 2797 |
| 2013 | 48 | 97 | 2894 |
| 2013 | 49 | 116 | 3010 |
| 2013 | 50 | 124 | 3134 |
| 2013 | 51 | 102 | 3236 |
| 2013 | 52 | 47 | 3283 |
| 2014 | 0 | 83 | 3366 |
| 2014 | 1 | 126 | 3492 |
| 2014 | 2 | 109 | 3601 |
| 2014 | 3 | 113 | 3714 |
| 2014 | 4 | 130 | 3844 |
| 2014 | 5 | 133 | 3977 |
| 2014 | 6 | 135 | 4112 |
| 2014 | 7 | 125 | 4237 |
| 2014 | 8 | 129 | 4366 |
| 2014 | 9 | 133 | 4499 |
| 2014 | 10 | 154 | 4653 |
| 2014 | 11 | 130 | 4783 |
| 2014 | 12 | 148 | 4931 |
| 2014 | 13 | 167 | 5098 |
| 2014 | 14 | 162 | 5260 |
| 2014 | 15 | 164 | 5424 |



| year | week_number | users_number | total_users |
|---|---|---|---|
| 2014 | 13 | 167 | 5098 |
| 2014 | 14 | 162 | 5260 |
| 2014 | 15 | 164 | 5424 |
| 2014 | 16 | 179 | 5603 |
| 2014 | 17 | 170 | 5773 |
| 2014 | 18 | 163 | 5936 |
| 2014 | 19 | 185 | 6121 |
| 2014 | 20 | 176 | 6297 |
| 2014 | 21 | 183 | 6480 |
| 2014 | 22 | 196 | 6676 |
| 2014 | 23 | 196 | 6872 |
| 2014 | 24 | 229 | 7101 |
| 2014 | 25 | 207 | 7308 |
| 2014 | 26 | 201 | 7509 |
| 2014 | 27 | 222 | 7731 |
| 2014 | 28 | 215 | 7946 |
| 2014 | 29 | 221 | 8167 |
| 2014 | 30 | 238 | 8405 |
| 2014 | 31 | 193 | 8598 |
| 2014 | 32 | 245 | 8843 |
| 2014 | 33 | 261 | 9104 |
| 2014 | 34 | 259 | 9363 |
| 2014 | 35 | 18 | 9381 |

**Insights:**

The images show the growth of users over a period of time. There is a continuous increase in total users each month from 2013 week 0 to 2014 week 35.

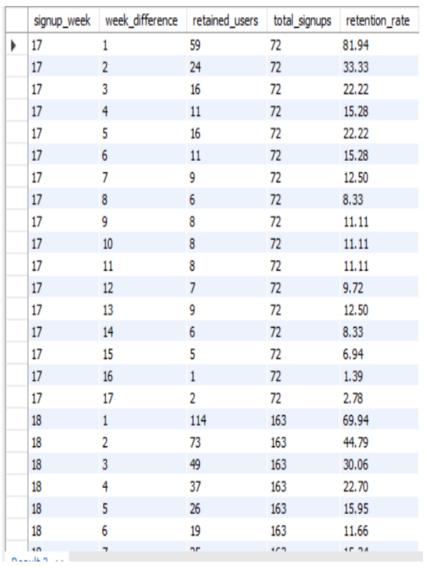
**3)** Weekly Retention Analysis:

Objective: Analyze the retention of users on a weekly basis after signing up for a product.

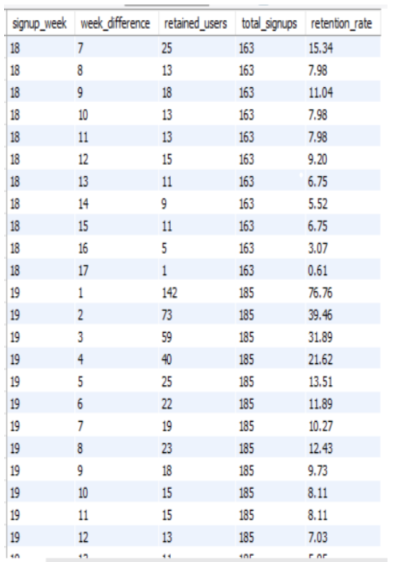
**Code:**

```
WITH signups AS (SELECT user_id, week(occurred_at) AS signup_week, count(user_id) AS retained_users FROM events
WHERE event_type = 'signup_flow' AND event_name = 'complete_signup'
GROUP BY user_id, signup_week),


engagement AS (SELECT user_id, week(occurred_at) AS engagement_week FROM events
WHERE event_type = 'engagement'
GROUP BY user_id, engagement_week),
user_weeks AS (
SELECT s.user_id, s.signup_week, e.engagement_week, e.engagement_week - s.signup_week AS
week_difference
FROM signups AS s
JOIN engagement AS e
ON s.user_id = e.user_id
WHERE e.engagement_week > s.signup_week),

weekly_retention AS (
SELECT signup_week, week_difference, count(distinct user_id) AS retained_users FROM
user_weeks
GROUP BY signup_week, week_difference),

total_signups AS (
SELECT signup_week, count(distinct user_id) AS total_signups FROM signups
GROUP BY signup_week)

SELECT ts.signup_week, wr.week_difference, wr.retained_users, ts.total_signups,
round(wr.retained_users * 100 / ts.total_signups,2) AS retention_rate
FROM weekly_retention AS wr
JOIN total_signups AS ts
ON wr.signup_week = ts.signup_week
ORDER BY ts.signup_week, wr.week_difference;
```

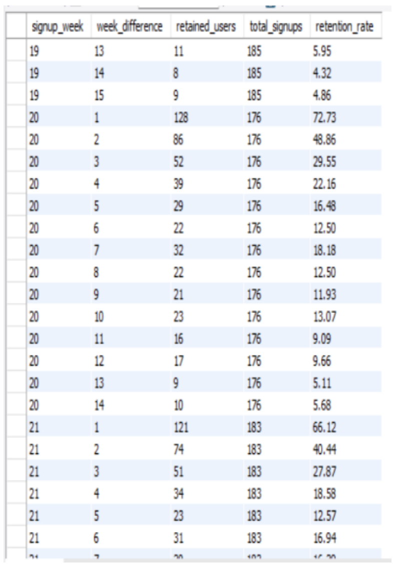
Results:



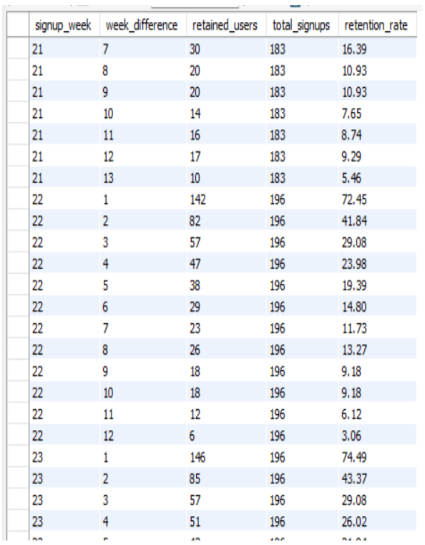
| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| ▶ | 17 | 1 | 59 | 72 | 81.94 |
| | 17 | 2 | 24 | 72 | 33.33 |
| | 17 | 3 | 16 | 72 | 22.22 |
| | 17 | 4 | 11 | 72 | 15.28 |
| | 17 | 5 | 16 | 72 | 22.22 |
| | 17 | 6 | 11 | 72 | 15.28 |
| | 17 | 7 | 9 | 72 | 12.50 |
| | 17 | 8 | 6 | 72 | 8.33 |
| | 17 | 9 | 8 | 72 | 11.11 |
| | 17 | 10 | 8 | 72 | 11.11 |
| | 17 | 11 | 8 | 72 | 11.11 |
| | 17 | 12 | 7 | 72 | 9.72 |
| | 17 | 13 | 9 | 72 | 12.50 |
| | 17 | 14 | 6 | 72 | 8.33 |
| | 17 | 15 | 5 | 72 | 6.94 |
| | 17 | 16 | 1 | 72 | 1.39 |
| | 17 | 17 | 2 | 72 | 2.78 |
| | 18 | 1 | 114 | 163 | 69.94 |
| | 18 | 2 | 73 | 163 | 44.79 |
| | 18 | 3 | 49 | 163 | 30.06 |
| | 18 | 4 | 37 | 163 | 22.70 |
| | 18 | 5 | 26 | 163 | 15.95 |
| | 18 | 6 | 19 | 163 | 11.66 |



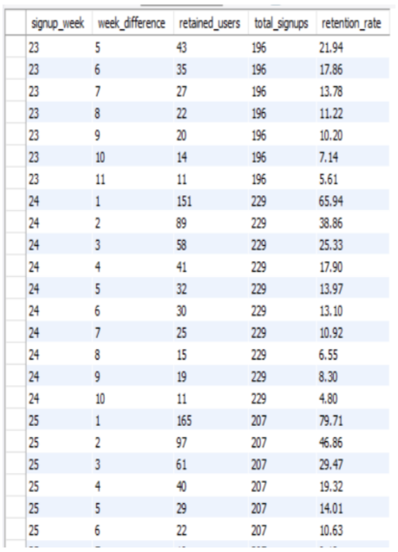
| signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|
| 18 | 7 | 25 | 163 | 15.34 |
| 18 | 8 | 13 | 163 | 7.98 |
| 18 | 9 | 18 | 163 | 11.04 |
| 18 | 10 | 13 | 163 | 7.98 |
| 18 | 11 | 13 | 163 | 7.98 |
| 18 | 12 | 15 | 163 | 9.20 |
| 18 | 13 | 11 | 163 | 6.75 |
| 18 | 14 | 9 | 163 | 5.52 |
| 18 | 15 | 11 | 163 | 6.75 |
| 18 | 16 | 5 | 163 | 3.07 |
| 18 | 17 | 1 | 163 | 0.61 |
| 19 | 1 | 142 | 185 | 76.76 |
| 19 | 2 | 73 | 185 | 39.46 |
| 19 | 3 | 59 | 185 | 31.89 |
| 19 | 4 | 40 | 185 | 21.62 |
| 19 | 5 | 25 | 185 | 13.51 |
| 19 | 6 | 22 | 185 | 11.89 |
| 19 | 7 | 19 | 185 | 10.27 |
| 19 | 8 | 23 | 185 | 12.43 |
| 19 | 9 | 18 | 185 | 9.73 |
| 19 | 10 | 15 | 185 | 8.11 |
| 19 | 11 | 15 | 185 | 8.11 |
| 19 | 12 | 13 | 185 | 7.03 |



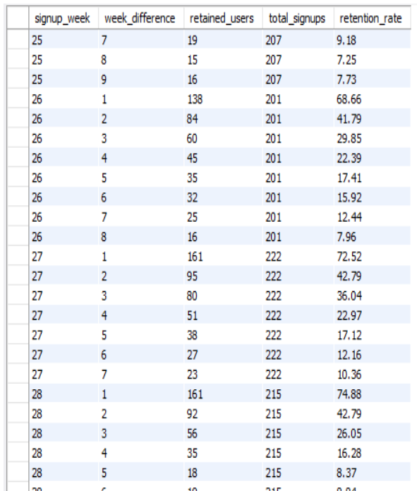
| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| | 19 | 13 | 11 | 185 | 5.95 |
| | 19 | 14 | 8 | 185 | 4.32 |
| | 19 | 15 | 9 | 185 | 4.86 |
| | 20 | 1 | 128 | 176 | 72.73 |
| | 20 | 2 | 86 | 176 | 48.86 |
| | 20 | 3 | 52 | 176 | 29.55 |
| | 20 | 4 | 39 | 176 | 22.16 |
| | 20 | 5 | 29 | 176 | 16.48 |
| | 20 | 6 | 22 | 176 | 12.50 |
| | 20 | 7 | 32 | 176 | 18.18 |
| | 20 | 8 | 22 | 176 | 12.50 |
| | 20 | 9 | 21 | 176 | 11.93 |
| | 20 | 10 | 23 | 176 | 13.07 |
| | 20 | 11 | 16 | 176 | 9.09 |
| | 20 | 12 | 17 | 176 | 9.66 |
| | 20 | 13 | 9 | 176 | 5.11 |
| | 20 | 14 | 10 | 176 | 5.68 |
| | 21 | 1 | 121 | 183 | 66.12 |
| | 21 | 2 | 74 | 183 | 40.44 |
| | 21 | 3 | 51 | 183 | 27.87 |
| | 21 | 4 | 34 | 183 | 18.58 |
| | 21 | 5 | 23 | 183 | 12.57 |
| | 21 | 6 | 31 | 183 | 16.94 |



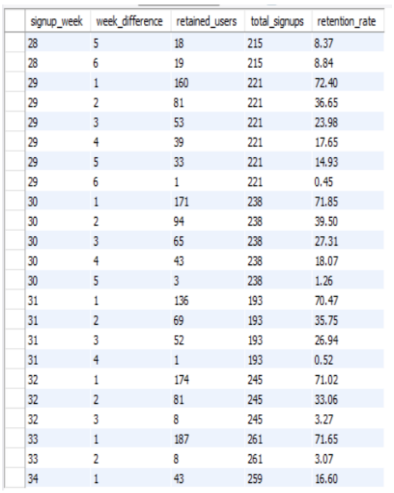
| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| | 21 | 7 | 30 | 183 | 16.39 |
| | 21 | 8 | 20 | 183 | 10.93 |
| | 21 | 9 | 20 | 183 | 10.93 |
| | 21 | 10 | 14 | 183 | 7.65 |
| | 21 | 11 | 16 | 183 | 8.74 |
| | 21 | 12 | 17 | 183 | 9.29 |
| | 21 | 13 | 10 | 183 | 5.46 |
| | 22 | 1 | 142 | 196 | 72.45 |
| | 22 | 2 | 82 | 196 | 41.84 |
| | 22 | 3 | 57 | 196 | 29.08 |
| | 22 | 4 | 47 | 196 | 23.98 |
| | 22 | 5 | 38 | 196 | 19.39 |
| | 22 | 6 | 29 | 196 | 14.80 |
| | 22 | 7 | 23 | 196 | 11.73 |
| | 22 | 8 | 26 | 196 | 13.27 |
| | 22 | 9 | 18 | 196 | 9.18 |
| | 22 | 10 | 18 | 196 | 9.18 |
| | 22 | 11 | 12 | 196 | 6.12 |
| | 22 | 12 | 6 | 196 | 3.06 |
| | 23 | 1 | 146 | 196 | 74.49 |
| | 23 | 2 | 85 | 196 | 43.37 |
| | 23 | 3 | 57 | 196 | 29.08 |
| | 23 | 4 | 51 | 196 | 26.02 |



| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| | 23 | 5 | 43 | 196 | 21.94 |
| | 23 | 6 | 35 | 196 | 17.86 |
| | 23 | 7 | 27 | 196 | 13.78 |
| | 23 | 8 | 22 | 196 | 11.22 |
| | 23 | 9 | 20 | 196 | 10.20 |
| | 23 | 10 | 14 | 196 | 7.14 |
| | 23 | 11 | 11 | 196 | 5.61 |
| | 24 | 1 | 151 | 229 | 65.94 |
| | 24 | 2 | 89 | 229 | 38.86 |
| | 24 | 3 | 58 | 229 | 25.33 |
| | 24 | 4 | 41 | 229 | 17.90 |
| | 24 | 5 | 32 | 229 | 13.97 |
| | 24 | 6 | 30 | 229 | 13.10 |
| | 24 | 7 | 25 | 229 | 10.92 |
| | 24 | 8 | 15 | 229 | 6.55 |
| | 24 | 9 | 19 | 229 | 8.30 |
| | 24 | 10 | 11 | 229 | 4.80 |
| | 25 | 1 | 165 | 207 | 79.71 |
| | 25 | 2 | 97 | 207 | 46.86 |
| | 25 | 3 | 61 | 207 | 29.47 |
| | 25 | 4 | 40 | 207 | 19.32 |
| | 25 | 5 | 29 | 207 | 14.01 |
| | 25 | 6 | 22 | 207 | 10.63 |



| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| | 25 | 7 | 19 | 207 | 9.18 |
| | 25 | 8 | 15 | 207 | 7.25 |
| | 25 | 9 | 16 | 207 | 7.73 |
| | 26 | 1 | 138 | 201 | 68.66 |
| | 26 | 2 | 84 | 201 | 41.79 |
| | 26 | 3 | 60 | 201 | 29.85 |
| | 26 | 4 | 45 | 201 | 22.39 |
| | 26 | 5 | 35 | 201 | 17.41 |
| | 26 | 6 | 32 | 201 | 15.92 |
| | 26 | 7 | 25 | 201 | 12.44 |
| | 26 | 8 | 16 | 201 | 7.96 |
| | 27 | 1 | 161 | 222 | 72.52 |
| | 27 | 2 | 95 | 222 | 42.79 |
| | 27 | 3 | 80 | 222 | 36.04 |
| | 27 | 4 | 51 | 222 | 22.97 |
| | 27 | 5 | 38 | 222 | 17.12 |
| | 27 | 6 | 27 | 222 | 12.16 |
| | 27 | 7 | 23 | 222 | 10.36 |
| | 28 | 1 | 161 | 215 | 74.88 |
| | 28 | 2 | 92 | 215 | 42.79 |
| | 28 | 3 | 56 | 215 | 26.05 |
| | 28 | 4 | 35 | 215 | 16.28 |
| | 28 | 5 | 18 | 215 | 8.37 |



| | signup_week | week_difference | retained_users | total_signups | retention_rate |
|---|---|---|---|---|---|
| | 28 | 5 | 18 | 215 | 8.37 |
| | 28 | 6 | 19 | 215 | 8.84 |
| | 29 | 1 | 160 | 221 | 72.40 |
| | 29 | 2 | 81 | 221 | 36.65 |
| | 29 | 3 | 53 | 221 | 23.98 |
| | 29 | 4 | 39 | 221 | 17.65 |
| | 29 | 5 | 33 | 221 | 14.93 |
| | 29 | 6 | 1 | 221 | 0.45 |
| | 30 | 1 | 171 | 238 | 71.85 |
| | 30 | 2 | 94 | 238 | 39.50 |
| | 30 | 3 | 65 | 238 | 27.31 |
| | 30 | 4 | 43 | 238 | 18.07 |
| | 30 | 5 | 3 | 238 | 1.26 |
| | 31 | 1 | 136 | 193 | 70.47 |
| | 31 | 2 | 69 | 193 | 35.75 |
| | 31 | 3 | 52 | 193 | 26.94 |
| | 31 | 4 | 1 | 193 | 0.52 |
| | 32 | 1 | 174 | 245 | 71.02 |
| | 32 | 2 | 81 | 245 | 33.06 |
| | 32 | 3 | 8 | 245 | 3.27 |
| | 33 | 1 | 187 | 261 | 71.65 |
| | 33 | 2 | 8 | 261 | 3.07 |
| | 34 | 1 | 43 | 259 | 16.60 |

**Insights:**

The above images show the retention of users on a weekly basis after signing up for a product. The signup_week shows the week the user has signup, week_difference gives the information, how many weeks the users were retained from the users that signup in that signup_week. Retained_users are the users those who were retained at the end of the week. Total_signups are the total users who have signup in that week. Retention_rate is percentage of users that were retained at the end of the week.

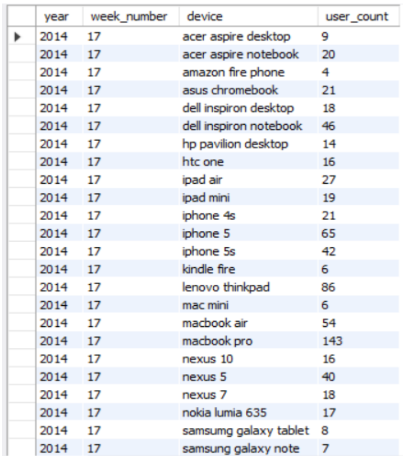
**4) Weekly Engagement Per Device:**

**Objective:** Measure the activeness of users on a weekly basis per device.

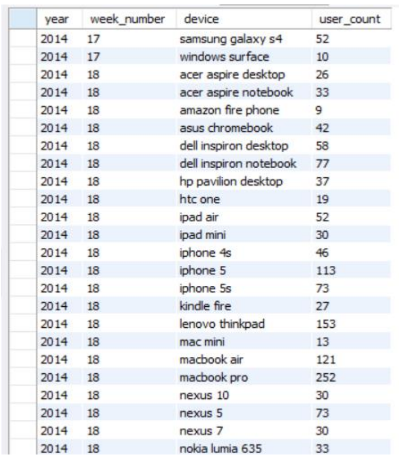
**Code:**

```
SELECT year(occurred_at) AS year, week(occurred_at) AS week_number, device, count(distinct
user_id) AS user_count FROM events
WHERE event_type = 'engagement'
GROUP BY year, week_number, device;
```

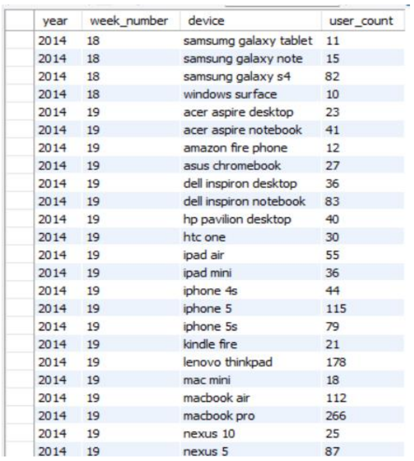
Results:



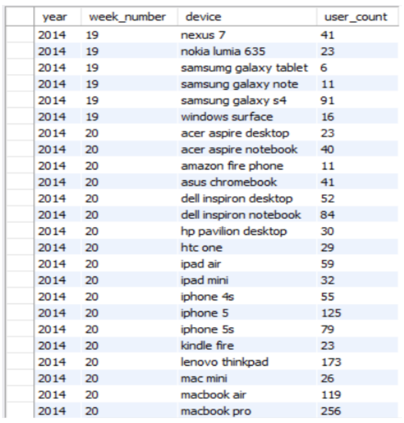
| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 17 | acer aspire desktop | 9 |
| 2014 | 17 | acer aspire notebook | 20 |
| 2014 | 17 | amazon fire phone | 4 |
| 2014 | 17 | asus chromebook | 21 |
| 2014 | 17 | dell inspiron desktop | 18 |
| 2014 | 17 | dell inspiron notebook | 46 |
| 2014 | 17 | hp pavilion desktop | 14 |
| 2014 | 17 | htc one | 16 |
| 2014 | 17 | ipad air | 27 |
| 2014 | 17 | ipad mini | 19 |
| 2014 | 17 | iphone 4s | 21 |
| 2014 | 17 | iphone 5 | 65 |
| 2014 | 17 | iphone 5s | 42 |
| 2014 | 17 | kindle fire | 6 |
| 2014 | 17 | lenovo thinkpad | 86 |
| 2014 | 17 | mac mini | 6 |
| 2014 | 17 | macbook air | 54 |
| 2014 | 17 | macbook pro | 143 |
| 2014 | 17 | nexus 10 | 16 |
| 2014 | 17 | nexus 5 | 40 |
| 2014 | 17 | nexus 7 | 18 |
| 2014 | 17 | nokia lumia 635 | 17 |
| 2014 | 17 | samsumg galaxy tablet | 8 |
| 2014 | 17 | samsung galaxy note | 7 |



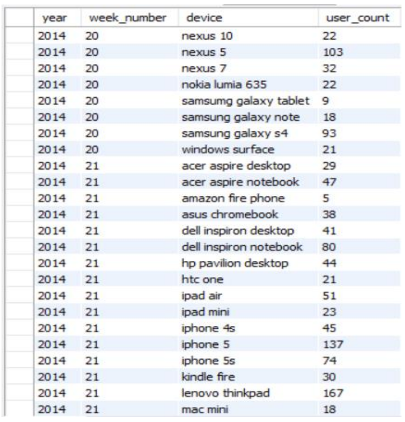
| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 17 | samsung galaxy s4 | 52 |
| 2014 | 17 | windows surface | 10 |
| 2014 | 18 | acer aspire desktop | 26 |
| 2014 | 18 | acer aspire notebook | 33 |
| 2014 | 18 | amazon fire phone | 9 |
| 2014 | 18 | asus chromebook | 42 |
| 2014 | 18 | dell inspiron desktop | 58 |
| 2014 | 18 | dell inspiron notebook | 77 |
| 2014 | 18 | hp pavilion desktop | 37 |
| 2014 | 18 | htc one | 19 |
| 2014 | 18 | ipad air | 52 |
| 2014 | 18 | ipad mini | 30 |
| 2014 | 18 | iphone 4s | 46 |
| 2014 | 18 | iphone 5 | 113 |
| 2014 | 18 | iphone 5s | 73 |
| 2014 | 18 | kindle fire | 27 |
| 2014 | 18 | lenovo thinkpad | 153 |
| 2014 | 18 | mac mini | 13 |
| 2014 | 18 | macbook air | 121 |
| 2014 | 18 | macbook pro | 252 |
| 2014 | 18 | nexus 10 | 30 |
| 2014 | 18 | nexus 5 | 73 |
| 2014 | 18 | nexus 7 | 30 |
| 2014 | 18 | nokia lumia 635 | 33 |



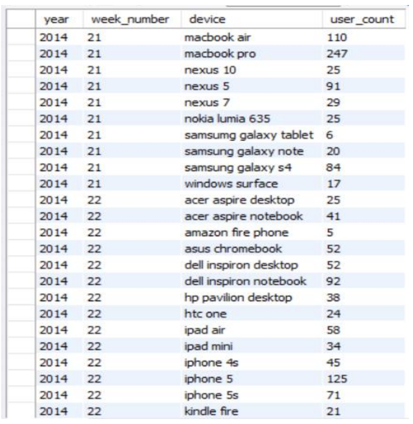
| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 18 | samsumg galaxy tablet | 11 |
| 2014 | 18 | samsung galaxy note | 15 |
| 2014 | 18 | samsung galaxy s4 | 82 |
| 2014 | 18 | windows surface | 10 |
| 2014 | 19 | acer aspire desktop | 23 |
| 2014 | 19 | acer aspire notebook | 41 |
| 2014 | 19 | amazon fire phone | 12 |
| 2014 | 19 | asus chromebook | 27 |
| 2014 | 19 | dell inspiron desktop | 36 |
| 2014 | 19 | dell inspiron notebook | 83 |
| 2014 | 19 | hp pavilion desktop | 40 |
| 2014 | 19 | htc one | 30 |
| 2014 | 19 | ipad air | 55 |
| 2014 | 19 | ipad mini | 36 |
| 2014 | 19 | iphone 4s | 44 |
| 2014 | 19 | iphone 5 | 115 |
| 2014 | 19 | iphone 5s | 79 |
| 2014 | 19 | kindle fire | 21 |
| 2014 | 19 | lenovo thinkpad | 178 |
| 2014 | 19 | mac mini | 18 |
| 2014 | 19 | macbook air | 112 |
| 2014 | 19 | macbook pro | 266 |
| 2014 | 19 | nexus 10 | 25 |
| 2014 | 19 | nexus 5 | 87 |



| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 19 | nexus 7 | 41 |
| 2014 | 19 | nokia lumia 635 | 23 |
| 2014 | 19 | samsumg galaxy tablet | 6 |
| 2014 | 19 | samsung galaxy note | 11 |
| 2014 | 19 | samsung galaxy s4 | 91 |
| 2014 | 19 | windows surface | 16 |
| 2014 | 20 | acer aspire desktop | 23 |
| 2014 | 20 | acer aspire notebook | 40 |
| 2014 | 20 | amazon fire phone | 11 |
| 2014 | 20 | asus chromebook | 41 |
| 2014 | 20 | dell inspiron desktop | 52 |
| 2014 | 20 | dell inspiron notebook | 84 |
| 2014 | 20 | hp pavilion desktop | 30 |
| 2014 | 20 | htc one | 29 |
| 2014 | 20 | ipad air | 59 |
| 2014 | 20 | ipad mini | 32 |
| 2014 | 20 | iphone 4s | 55 |
| 2014 | 20 | iphone 5 | 125 |
| 2014 | 20 | iphone 5s | 79 |
| 2014 | 20 | kindle fire | 23 |
| 2014 | 20 | lenovo thinkpad | 173 |
| 2014 | 20 | mac mini | 26 |
| 2014 | 20 | macbook air | 119 |
| 2014 | 20 | macbook pro | 256 |



| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 20 | nexus 10 | 22 |
| 2014 | 20 | nexus 5 | 103 |
| 2014 | 20 | nexus 7 | 32 |
| 2014 | 20 | nokia lumia 635 | 22 |
| 2014 | 20 | samsumg galaxy tablet | 9 |
| 2014 | 20 | samsung galaxy note | 18 |
| 2014 | 20 | samsung galaxy s4 | 93 |
| 2014 | 20 | windows surface | 21 |
| 2014 | 21 | acer aspire desktop | 29 |
| 2014 | 21 | acer aspire notebook | 47 |
| 2014 | 21 | amazon fire phone | 5 |
| 2014 | 21 | asus chromebook | 38 |
| 2014 | 21 | dell inspiron desktop | 41 |
| 2014 | 21 | dell inspiron notebook | 80 |
| 2014 | 21 | hp pavilion desktop | 44 |
| 2014 | 21 | htc one | 21 |
| 2014 | 21 | ipad air | 51 |
| 2014 | 21 | ipad mini | 23 |
| 2014 | 21 | iphone 4s | 45 |
| 2014 | 21 | iphone 5 | 137 |
| 2014 | 21 | iphone 5s | 74 |
| 2014 | 21 | kindle fire | 30 |
| 2014 | 21 | lenovo thinkpad | 167 |
| 2014 | 21 | mac mini | 18 |



| year | week_number | device | user_count |
|---|---|---|---|
| 2014 | 21 | macbook air | 110 |
| 2014 | 21 | macbook pro | 247 |
| 2014 | 21 | nexus 10 | 25 |
| 2014 | 21 | nexus 5 | 91 |
| 2014 | 21 | nexus 7 | 29 |
| 2014 | 21 | nokia lumia 635 | 25 |
| 2014 | 21 | samsumg galaxy tablet | 6 |
| 2014 | 21 | samsung galaxy note | 20 |
| 2014 | 21 | samsung galaxy s4 | 84 |
| 2014 | 21 | windows surface | 17 |
| 2014 | 22 | acer aspire desktop | 25 |
| 2014 | 22 | acer aspire notebook | 41 |
| 2014 | 22 | amazon fire phone | 5 |
| 2014 | 22 | asus chromebook | 52 |
| 2014 | 22 | dell inspiron desktop | 52 |
| 2014 | 22 | dell inspiron notebook | 92 |
| 2014 | 22 | hp pavilion desktop | 38 |
| 2014 | 22 | htc one | 24 |
| 2014 | 22 | ipad air | 58 |
| 2014 | 22 | ipad mini | 34 |
| 2014 | 22 | iphone 4s | 45 |
| 2014 | 22 | iphone 5 | 125 |
| 2014 | 22 | iphone 5s | 71 |
| 2014 | 22 | kindle fire | 21 |

**Insights:**

The above images show the activeness of users on a weekly basis per device. Year and week columns show the year and week. Device column shows the device used by the users. Users_count is count of users using the device in a particular week of the year. 2014, Week 30, macbook pro device has largest users count of 322 users in that week.

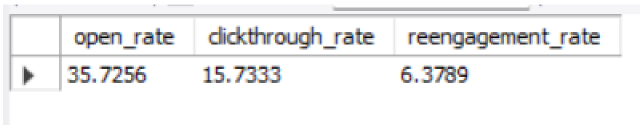
**5) Email Engagement Analysis:**

**Objective:** Analyze how users are engaging with the email service.

**Code:**

```
WITH email_engagement AS ( SELECT sum(CASE WHEN action = 'sent_weekly_digest' THEN 1
ELSE 0 END) AS total_sent,
sum(CASE WHEN action = 'email_open' THEN 1 ELSE 0 END) AS total_open,
sum(CASE WHEN action = 'email_clickthrough' THEN 1 ELSE 0 END) AS total_clickthrough,
sum(CASE WHEN action = 'sent_reengagement_email' THEN 1 ELSE 0 END) AS
total_reengagement FROM email_events)
SELECT total_open*100/total_sent AS open_rate,
total_clickthrough*100/total_sent AS clickthrough_rate,
total_reengagement*100/total_sent AS reengagement_rate FROM email_engagement;
```

**Results:**



| open_rate | clickthrough_rate | reengagement_rate |
|---|---|---|
| 35.7256 | 15.7333 | 6.3789 |

**Insights:**

The above image shows the engagement of users with the email service. Open_rate is the percentage of users who have open the email. Clickthrough_rate is the percentage of users who have clicked on a specific link attached in the email. Reengagement_rate is the percentage of users who are already part of the other services and the new service is also offered. The open_rate of the users from the given data is 35.72%, clichthrough_rate is 15.73% and reengagement_rate is 6.37%.